REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

To place the subject application in better form, the specification has been amended to correct minor informalities. Also, a new abstract is presented in accordance with preferred practice. No new matter has been added by these changes.

Claims 1-13 are presented for consideration. Claims 1 and 11-13 are independent. Claims 1, 3 and 10-12 have been amended to clarify features of the subject invention, while claim 13 has been added to recite additional features of the subject invention. Support for these changes and this claim can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant request favorable reconsideration and withdrawal of the rejections set forth in the above-noted Office Action.

Claims 1-4 and 9-12 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,069,417 to Yuan et al. Claims 5-8 were rejected under 35 U.S.C. § 103 as being unpatentable over the Yuan et al. patent in view of U.S. Patent No. 4,945,268 to Nihei et al. Applicant submits that the cited art, whether taken individually or in combination, does not teach or suggest many features of the present invention as previously recited in claims 1-12. Therefore, these rejections are respectfully traversed. Nevertheless, Applicant submits that independent claims 1 and 11-13, for example, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the present invention, independent claim 1 recites a positioning apparatus including a movable member for transmitting a driving force in a driving-axis direction to a stage, a first electromagnet for driving the movable member in the driving-axis direction by forming a magnetic path between the movable member and the first electromagnet and generating first magnetic flux, and a second electromagnet, which is positioned away from the first electromagnet and arranged in an overlapping direction, for driving the movable member in the same direction as the driving-axis direction of the first electromagnet by forming a magnetic path between the movable member and the second electromagnet and generating second magnetic flux having an inverted plurality from the first magnetic flux.

In another aspect of the present invention, independent claim 11 recites a charged-particle beam exposure apparatus including a charged-particle source for irradiating a charged-particle beam, a first electron optical system, having a plurality of electron lenses, for forming a plurality of intermediate images of the charged-particle source by the plurality of electron lenses, a second electron optical system for projecting the plurality of intermediate images, formed by the first electron optical system, on a substrate, and a positioning apparatus, holding the substrate, for driving a stage to a predetermined position to perform positioning of the stage. The positioning apparatus includes a movable member for transmitting a driving force in a driving-axis direction to a stage, a first electromagnet for driving the movable member in the driving-axis direction by forming a magnetic path between the movable member and the first electromagnet and generating first magnetic flux, and a second electromagnet, which is positioned away from the first electromagnet and arranged in an overlapping direction, for driving the movable member in

the same direction as the driving-axis direction of the first electromagnet by forming a magnetic path between the movable member and the second electromagnet and generating second magnetic flux having an inverted polarity from the first magnetic flux.

In a further aspect of the present invention, independent claim 12 recites a device manufacturing method including a step of installing a plurality of semiconductor manufacturing apparatuses, including a charged-particle-beam exposure apparatus, in a factory, and a step of manufacturing a semiconductor device by using the plurality of semiconductor manufacturing apparatuses. The charged-particle-beam exposure apparatus includes a charged-particle source for irradiating a charged-particle beam, a first electron optical system, having a plurality of electron lenses, for forming a plurality of intermediate images of the charged-particle source by the plurality of electron lenses, a second electron optical system for projecting the plurality of intermediate images, formed by the first electron optical system, on a substrate, and a positioning apparatus, holding the substrate, for driving a stage to a predetermined position to perform positioning of the stage. The positioning apparatus includes a movable member for transmitting a driving force in a driving-axis direction to a stage, a first electromagnet for driving the movable member in the driving-axis direction by forming a magnetic path between the movable member and the first electromagnet and generating first magnetic flux, and a second electromagnet, which is positioned away from the first electromagnet and arranged in an overlapping direction, for driving the movable member in the same direction as the driving-axis direction of the first electromagnet by forming a magnetic path between the movable member and the second

electromagnet and generating second magnetic flux having an inverted polarity from the first magnetic flux.

In still another aspect of the present invention, independent claim 13 recites a positioning apparatus including a movable member for transmitting a driving force in a driving-axis direction to a stage, a first electromagnet for driving said movable member in the driving-axis direction by forming a magnetic path between the movable member and the first electromagnet and generating first magnetic flux, and a second electromagnet, which is positioned away from the first electromagnet and arranged in an overlapping direction, which is a perpendicular direction to the driving-axis direction of the first electromagnet, for driving the movable member in the driving-axis direction by forming a magnetic path between the movable member and the second electromagnet and generating second magnetic flux having an inverted polarity from the first magnetic flux.

Accordingly, in the present invention recited in independent claims 1, 11 and 12, for example, a second electromagnet can be arranged for driving a movable member in a same direction as a driving-axis direction of a first electromagnet, and, as recited in independent claim 13, for example, a second electromagnet can be arranged for driving a movable member in an overlapping direction, which is a direction perpendicular to the driving-axis direction of the first electromagnet. In such an arrangement, the first and second electromagnets can generate driving forces in the same direction, or orthogonal directions, in order to drive the movable member.

Applicant submits that the cited art, whether taken individually or in combination, does not teach or suggest such features of the present invention, as recited in independent claims 1 and 11-13.

The Yuan et al. patent shows a technique for controlling a stage driven by two electromagnets (45, 52). In that patent, the electromagnet 42 is disposed to generate a driving force of an opposite direction to a driving force generated by the electromagnet 52. The driving forces generated by the electromagnets 42 and 52 drive an I-core in an X(+) or an X(-) direction. In that patent, however, the electromagnets 42 and 52 are not arranged in an overlapping direction, which is a direction perpendicular to a driving-axis direction. In turn, in the Yuan et al. patent, the electromagnets 42 and 52 do not generate driving forces in the same direction or orthogonal directions. Applicant submits, therefore, that, in the arrangement taught in the Yuan et al. patent, it is not possible to reduce the generation of leaking flux. Accordingly, Applicant submits that the arrangement shown in the Yuan et al. patent differs in many respects from the present invention recited in independent claims 1 and 11-13.

Applicant further submits that the remaining art cited does not cure the deficiencies noted above with respect to the Yuan et al. patent.

The Nihei et al. patent shows a permanent magnet-type linear pulse motor driven by magnetic pull forces generated by an A-phase stator and a B-phase stator. In that patent, however, the stators of the same phase are opposed through a mover, so that magnetic pull forces that function between the stators and the mover are to be canceled. This is shown in Figures 7 and 8 of the Nihei et al. patent. Applicant submits, however, that the Nihei et al. patent, as with

the Yuan et al. patent, does not teach or suggest an arrangement in which electromagnets are arranged in an overlapping direction in order to generate magnetic pull forces in the same direction, or in orthogonal directions. Applicant submits, therefore, that the Nihei et al. patent adds nothing to the teachings of the Yuan et al. patent that would render obvious Applicant's present invention, as recited in independent claims 1 and 11-13.

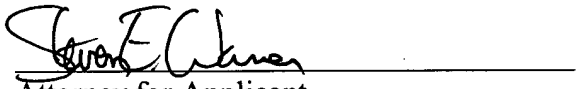
For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 1 and 11-13, is patentably defined over the cited art.

Dependent claims 2-10 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in independent claim 1. Further individual consideration of these dependent claims is requested.

Applicant further submits that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010 All correspondence should continue to be directed to our address given below.

Respectfully submitted,



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